
FINANCIAL FRAUD RISK MANAGEMENT IN DAIRY COMPANIES IN SERBIA

Milan Resimić¹, Snežana Knežević², Stefan Milojević³

*Corresponding author E-mail: snezana.knezevic@fon.bg.ac.rs

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ABSTRACT

This paper examines the management of fraud risk in dairy companies. The research was conducted on a random sample of 110 respondents employed in companies operating within the dairy industry in the Republic of Serbia, who hold key managerial positions (general manager or chief financial officer) or perform roles such as internal auditor, risk controller, head of accounting, or similar positions. The Partial Least Squares Structural Equation Modelling (PLS-SEM) method was applied in the analysis. The findings indicate that awareness of operational fraud becomes a protective factor only when it leads to the concrete improvement of control and preventive mechanisms. The results contribute to a better understanding of the necessity to strengthen managerial capacities and the regulatory framework to enhance financial transparency and protect the integrity of the dairy sector in Serbia.

Introduction

In 2024, the European Union produced 161.8 million tonnes of raw milk, which is 0.9 million tonnes more than in 2023. With regard to milk production at farms, according to Eurostat data (Eurostat, 2024), Germany ranks first in terms of production value, followed by France, Turkey, Poland, and the Netherlands.

As for Serbia, which has favorable natural conditions for the development of livestock farming, particularly cow's milk production (Tomić et al., 2020), data from the Statistical

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- 1 Milan Resimić, Ph.D. Student, University of Belgrade, Faculty of Organizational Sciences, Jove Ilića 154, 11000 Belgrade, Serbia, Phone: +381 65 2223 113, E-mail: apostolcentar@yahoo.com, ORCID ID: (<https://orcid.org/0009-0002-3101-845X>)
 - 2 Snežana Knežević, Ph.D., Full Professor, University of Belgrade, Faculty of Organizational Sciences, Jove Ilića 154, 11000 Belgrade, Serbia, Phone: +381 63 345 230 E-mail: snezana.knezevic@fon.bg.ac.rs, ORCID ID: (<https://orcid.org/0000-0001-9833-7274>)
 - 3 Stefan Milojević, Ph.D., Associate Professor, EDUCONS University, Faculty of Business Economic, Vojvode Putnika 87, 21208, Sremska Kamenica, Serbia, Phone: +381 61 2300 006, E-mail: stefan.milojevic@educons.edu.rs, ORCID ID: (<https://orcid.org/0000-0001-6240-6776>)

Office of the Republic of Serbia (SORS, 2024) indicate that cow's milk production recorded a slight increase in 2024 compared to the previous year, while the production of dairy products declined. Total milk production (all types of milk) on farms amounted to 1,379,000 tonnes, of which cow's milk accounted for 1,350,000 tonnes (98%).

According to financial statements data (Business Registers Agency, 2024), companies engaged in milk processing and cheese production in Serbia generated total profits of RSD 3,936,626,000 in 2024, with 353 companies operating in this sector. Table 1 presents ten companies ranked by revenue and profit achieved in 2024. It is not sufficient to state that one dairy company is more profitable than another; rather, the causes and factors that likely influenced such outcomes must also be considered (Mitrović et al., 2015:1068). Users of financial statements can improve decision-making by applying various analytical models (Kovjanić et al., 2023).

Ten companies in milk processing and cheese production ranked by revenue and profit in 2024 are: AD IMLEK, MLEKARA-UB DOO, SOMBOLED DOO SOMBOR, GRANICE DOO MLADENOVAC, MILK HOUSE DOO, MLEKOPRODUKT ZRENJANIN, MILOVANOVIĆ DOO, MLEKARA MIHAJLOVIĆ DOO PARAĆIN, LAZAR DOO BLACE, ZORNIĆ DOO TUTIN-VELJE POLJE (Business Registers Agency, 2024).

From the complexity of supply chains, volatility of purchase prices, and underdeveloped internal control mechanisms, numerous risk factors arise. The dairy sector displays a heightened vulnerability to financial manipulation, primarily due to the predominance of cash-based transactions, recurrent inconsistencies in the measurement and processing of raw milk, and the potential for accounting irregularities in areas such as inventory valuation, supplier invoicing, and the reporting of production costs.

Common manifestations of financial fraud within the dairy sector encompass the falsification of invoices and raw material quantity records, manipulation of yield and loss indicators during production, fabrication of procurements and related-party contractual arrangements, covert misappropriation of inventories, and financial reporting distortion through inappropriate inventory valuation and the unrealized revenues recognition.

Limited process transparency, inadequate accounting controls, digital traceability, and forensic methodologies substantially elevate fraud risk. In order to mitigate these vulnerabilities, it is necessary to implement a risk management framework integrating financial forensics, strengthened internal controls, independent auditing, data analytics, and early warning systems.

In Serbia, to the best of the authors' knowledge, financial fraud in dairy enterprises remains an underexplored research area. Within a knowledge-based economy, the relevance of accounting information is increasing (Knežević et al., 2023). However, deficiencies in internal monitoring and fragmented audit oversight create systemic vulnerabilities that facilitate both the emergence and escalation of fraudulent practices.

The absence of standardized digitalization and advanced information systems across companies hinders effective detection and prevention of irregularities. Furthermore, limited forensic analysis, stemming from a shortage of specialized accounting expertise and inadequate implementation frameworks, constitutes a major barrier to addressing financial crime (Janković et al., 2023).

The purpose of this study was to explore how perceptions of different forms of fraud, ranging from financial reporting to operational and transactional misconduct, shape the extent of their adverse impact on business performance, while also assessing the mitigating role of preventive measures. Particular attention was paid to differentiating between the influence of general awareness of fraud risks and the tangible effects of formally implemented control and prevention mechanisms.

The study further sought to empirically assess whether preventive measures function exclusively by directly mitigating the adverse consequences of fraud, or whether they exert a more complex influence through moderating and mediating effects on the relationship between fraud perception and operating performance. Thereby, the paper aims to clarify the mechanisms by which fraud risk is transformed into measurable operating outcomes.

Finally, the paper aims to contribute to a better comprehension of fraud risk management from the perspective of organizational practices, emphasizing that the identification and perception of fraud are not sufficient without institutionalized preventive measures. Thus, the study provides an empirical basis for management recommendations regarding the development and strengthening of internal control and fraud prevention systems. Such an approach enables improved financial transparency, reduced losses, and increased confidence among investors and other stakeholders.

Literature Review

The dairy industry, a key segment of the food sector, is primarily engaged in the production and processing of milk and related products. Within this context, food fraud has emerged as a growing concern due to its potential to impose substantial financial losses and reputational damage. Milk, in particular, is highly susceptible to fraud and adulteration, often driven by financial gain or misguided efforts to improve hygiene standards. Such activities pose significant risks, including serious public health consequences (Handford et al., 2016).

Undergoing continuous transformation, the dairy industry is faced with a diverse set of challenges. Among the most critical issues highlighted by stakeholders are the rising demands for animal welfare, the need to improve herd health, the imperative to address environmental sustainability, the complexities of intergenerational ownership transfers, insufficient investment in pasture-focused research, the pursuit of sustainable and efficient industry structures, and the maintenance of competitive international marketing strategies (Conforten et al., 2008).

In circumstances characterized by the increasing sophistication of fraud risks and their potential consequences, dairy enterprises (as well as other companies) must develop and implement an adequate framework for the strategic mitigation of fraud risk, which in turn can have a positive impact on the optimization of financial performance. In a general sense, fraud is defined as intentional deception undertaken for financial or personal gain (Kabir Usman, 2013:4).

Fraud can be observed at two levels. The first is the corporate level, which involves abuse by internal actors and, sporadically, external collaborators, thereby undermining the company's financial position. The second level is the managerial level, which refers to deceptive practices by managers directed toward external stakeholders, usually aimed at preserving the company's reputation or its perceived performance. When defining a fraud risk management framework, it is necessary to give special consideration to these two main forms, in accordance with the organizational contexts in which they arise.

Accounting fraud has had a detrimental impact on global economies over recent decades, which underscores the assertion that fraud risk can and must be controlled. Fraudulent financial reporting generates significant losses for both corporations and individuals, and the majority of fraud cases are internal in nature. It is precisely the growing prevalence of such practices that has placed fraud detection and prevention at the center of attention of both academic researchers and practitioners. As a particularly important issue, it has also attracted substantial attention from regulators, auditors, accountants, and the general public. In this context, it is necessary to examine the scope and application of new technologies that enable the detection of fraud through real-time transaction monitoring, immediately as it occurs.

Generally speaking, integrity is an important element of organizational operations, while financial integrity represents a fundamental component of market systems, ensuring trust and stability in economic transactions. Raising awareness of organizational fraud should lead to improvements in the performance of financial integrity systems. The occurrence of financial fraud disrupts established market rules on the one hand and negatively affects financial integrity by undermining it on the other, which together results in adverse implications for the broader public interest. Integrating fraud prevention strategies with broader financial management practices requires the adoption of robust preventive and detection mechanisms, particularly in light of a turbulent and technologically dynamic business environment. This represents the most effective way to protect organizations from accounting fraud while simultaneously preserving systemic stability and enhancing efficiency.

Throughout the 1990s and early 2000s, numerous financial accounting scandals emerged in the United States and other countries. In response, jurisdictions such as the United States and Italy introduced legislative reforms to strengthen financial reporting and corporate governance frameworks (Sorensen & Miller, 2017). Historical fraud cases provide valuable insights for constructing models to identify and assess fraud risk, while the development of innovative techniques to prevent fraudulent reporting remains a critical element of comprehensive fraud risk management. All of this requires the

integration of fraud prevention strategies with broader financial management practices to improve the efficiency of this process.

Shi (2025) demonstrates that short-selling can serve as an effective mechanism for restraining corporate financial fraud, complementing regulatory oversight while functioning as a corrective force that expedites the market exit of low-quality firms and safeguards investor interests. A prominent illustration is Muddy Waters' short-selling of Huishan Dairy, ultimately leading to the company's delisting and the erosion of approximately 30 billion yuan in market value.

Ranking among the largest financial frauds in global business history is the Parmalat S.p.A. scandal, involving the Italian dairy and food corporation later acquired by the French multinational Lactalis, which is frequently described as the European counterpart to the Enron case. Exposed in 2003, the scandal revealed a €14 billion deficit arising from fraudulent practices, mismanagement, and oversight failures (Cambaza, 2024). Suspicion intensified when the firm, despite reporting substantial cash reserves, continued to seek large debt financing. On December 19, 2003, Parmalat disclosed that €3.95 billion in cash was missing from its balance sheet, while executives attempted to conceal evidence of off-balance-sheet transactions.

Materials and Methods

Sample Construction and Data

The research was conducted from February to March 2025 and included a total of 110 respondents. The study involved employees of companies operating in the Serbian dairy industry who were engaged in key managerial positions (general manager or chief financial officer) or held one of the following roles: internal auditor, risk controller, head of accounting, or similar positions. These respondents were identified as key informants with regard to the subject of the research.

The sampling process was based on a random sampling method, and respondents were approached via social media platforms. All participants were informed about the purpose and academic nature of the research, and anonymity was guaranteed. Additional assurance of anonymity and objectivity was achieved through the use of an online questionnaire for data collection.

As shown in Table 1, the sample was evenly distributed by gender, with 50% male and 50% female respondents. The majority of respondents held postgraduate degrees (52.7%), while 47.3% had completed undergraduate studies or lower levels of education. Most respondents had up to 10 years of work experience (72.7%), whereas 27.3% had more than 10 years of experience. Regarding organizational position, 47.3% of respondents were directors (general or financial directors), while 52.7% belonged to other categories of employees (internal auditors, risk controllers, heads of accounting, and others). Most respondents were employed in companies with 30 or fewer employees (54.5%), while 45.5% worked in larger companies.

Table 1. Structure of the sample

Variable		Absolute frequency	Relative frequency
Gender	Male	55	50%
	Female	55	50%
Education	Undergraduate or lower	52	47,3%
	Postgraduate (Master's/PhD)	58	52,7%
Work experience	≤ 10 years	80	72,7%
	> 10 years	30	27,3%
Position in company	Directors (General/CFO)	52	47,3%
	Other (Internal auditor/Risk controller/Head of accounting/Other)	58	52,7%
Number of employees	≤ 30	60	54,5%
	> 30	50	45,5%

Source: Authors' calculations

Research Design

The core research premise is that mere awareness of potential fraud (financial reporting and operational–transactional) is not sufficient to reduce the negative effects of fraud or to prevent it indirectly; such outcomes are achieved only when preventive measures are actively implemented. Accordingly, the following hypotheses were formulated:

H1: Perception of the existence of financial reporting fraud does not contribute to reducing the negative effects of fraud on business performance.

Awareness of the existence of fraudulent financial reporting does not in itself imply the undertaking of preventive actions. It is not sufficient for management and employees merely to identify the risk without recognizing the necessity of implementing effective control mechanisms, as in such cases, no changes will occur in the impact of fraud on business performance. It follows that the perception of fraud, if not accompanied by a concrete and operational response, will not mitigate the negative consequences for business operations.

H2: Perception of the existence of operational–transactional fraud does not contribute to reducing the negative effects of fraud on business performance.

Even when there is awareness that operational–transactional fraud exists, as it is often embedded in everyday business processes, such fraud may nevertheless persist and threaten the company's operations. Under such circumstances, mere perception of its existence, if not accompanied by enhanced internal controls and oversight, does not necessarily lead to a reduction in its negative impact on the organization's key financial performance indicators. Therefore, it is emphasized that awareness of operational–transactional fraud alone has no effect on the improvement of business performance.

H3: Preventive measures contribute to reducing the negative effects of fraud on business performance.

Preventive measures, such as strengthening internal controls, segregation of duties, and continuous employee training, represent key mechanisms for limiting the scope and consequences of fraud. Their adequate implementation may have a positive effect on the occurrence of fraud in terms of its frequency. Furthermore, such measures may lead to a reduction in financial losses resulting from fraud, as well as in reputational damage. In light of the above, it is assumed that preventive measures are relevant due to their contribution to mitigating the negative effects of fraud on the financial performance of enterprises.

H4: Preventive measures exert a significant mediating effect on the relationship between financial reporting fraud and the negative effects of fraud.

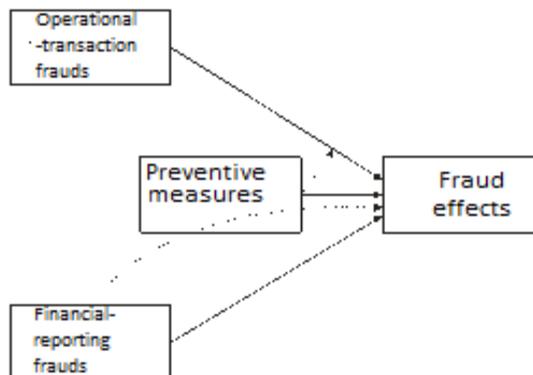
The impact of fraudulent financial reporting on business performance may be indirectly shaped through the implementation of preventive measures. Preventive activities can reduce the intensity and duration of negative consequences even when fraud is present. Therefore, it is assumed that preventive measures play a significant mediating role in the relationship between fraudulent financial reporting behavior and its negative effects.

H5: Preventive measures exert a significant mediating effect on the relationship between operational–transactional fraud and the negative effects of fraud.

Operational–transactional fraud is characterized by its direct impact on costs, efficiency, and the reliability of business processes; however, despite this, its effects may be mitigated through timely and appropriately designed preventive measures. The mechanisms that can be identified for this purpose, if properly implemented, can significantly limit the extent of damage and prevent the recurrence of similar abuses and fraudulent activities. From this, it can be inferred that preventive measures mediate the relationship between operational–transactional fraud and its negative effects on business performance.

Based on the above, a research model was constructed (Figure 1).

Figure 1. Research model



Source: Authors' calculations

Measurement of Constructs and Model

For this study, a structured questionnaire was developed, encompassing four variables: preventive measures, financial reporting fraud, operational–transactional fraud, and the effects of fraud on company performance. The questionnaire items were formulated based on relevant scientific literature (Sipayung et al., 2022; Špiler et al., 2024) and guidelines issued by leading international institutions in the field of fraud risk management (COSO & ACFE, 2023), with particular emphasis on adapting the items to the specific context of the dairy industry.

Content validity of the instrument was ensured through theoretical analysis and consultations with experts in accounting, auditing, and internal control, confirming that the statements were clearly formulated and relevant to the research framework. Each statement included in the questionnaire was assessed using a five-point Likert scale, where “1” indicated *Strongly disagree* and “5” indicated *Strongly agree*.

The first part of the questionnaire consisted of statements used to assess the status of the independent and dependent variables in the research model. The second part included questions related to the respondents’ sociodemographic characteristics (gender, education level, work experience, position in the company, number of employees, and possession of professional certifications), thereby providing data necessary to assess sample representativeness.

The constructs and measurement statistics are presented in Table 2. In accordance with the recommendations of Hair and Alamer (2022), indicators with convergent validity below 0.6, as well as those exhibiting high variance inflation factor ($VIF > 5$) values, were removed from the research model, as they indicated potential content overlap and data redundancy. The VIF values for all retained items were below 5, which is considered the strictest criterion; however, one item with a slightly higher value was retained because it satisfied other validity criteria and contributed to the overall robustness of the model. This procedure ensured that the relationships between variables were not distorted by the presence of multicollinearity (Hair & Alamer, 2022).

Table 2. Measurement of constructs

Constructs and items	Loadings	VIF	α	CR	AVE
Preventive Measures (PM)			0.911	0.938	0.604
PM1: The company undertakes consistent measures in response to reported fraud cases.	0.672	2.406			
PM2: The company has a code of conduct.	0.733	2.711			
PM3: Management’s attention is focused on fraud risk.	0.677	2.104			
PM4: Employees are included in a system for reporting suspicious activities (whistleblowing).	0.799	3.588			
PM5: Employee background checks are conducted within the company.	0.837	4.052			
PM6: Regulations are consistently enforced.	0.859	3.417			
PM7: An internal audit function exists.	0.837	3.038			

Constructs and items	Loadings	VIF	α	CR	AVE
PM8: Accounts are verified by qualified professionals.	0.784	3.084			
PM9: Employees are encouraged to report suspicious cases in good faith and with evidence (whistleblowing).	0.792	2.979			
PM10: Third parties (external auditors, fraud investigators) are regularly engaged to review transactions and accounts.	0.758	3.012			
Financial Reporting Fraud (FRF)			0.929	0.944	0.849
FRF1: Manipulation of accounting statements.	0.924	3.177			
FRF2: Falsification of documentation related to subsidies/incentives represents a significant problem.	0.921	2.980			
FRF3: Input costs (fertilizer, fuel) are often overstated to achieve financial gain.	0.920	3.103			
Operational–Transactional Fraud (OTF)			0.927	0.966	0.934
OTF1: Misappropriation of funds or assets (e.g., machinery, inventory) represents a real threat.	0.965	4.033			
OTF2: Fraud in production reporting (e.g., falsification of records on milk quantities) occurs frequently.	0.967	4.032			
Effects of Fraud (EF)			0.899	0.924	0.711
EF1: Fraud causes significant financial losses to the company.	0.865	3.177			
EF2: Fraud significantly undermines the company's reputation.	0.901	3.481			
EF3: Fraud reduces employees' trust in the company.	0.867	2.922			
EF4: Fraud may result in severe legal consequences for the company.	0.778	4.852			
EF5: Fraud may increase the risk of losing market share or competitive advantage.	0.798	5.192			

Source: Authors' calculations

Results

Data Analysis

To analyse the relationships between the constructs, the Partial Least Squares Structural Equation Modeling (PLS-SEM) method was employed. Confirmatory Factor Analysis (CFA) was conducted to examine the alignment of the measurement instruments with the theoretical constructs, and the results of the reliability and validity assessment are presented in Table 4. All constructs demonstrated satisfactory levels of internal consistency. Cronbach's alpha (α) values ranged from 0.899 to 0.929, while Composite Reliability (CR) values ranged from 0.924 to 0.966, which, according to the recommended threshold of 0.70, indicates a high level of measurement reliability.

The values of Average Variance Extracted (AVE) at the construct level ranged from 0.604 to 0.934, confirming convergent validity as well as a strong association between the observed indicators and their respective underlying constructs. Factor loadings ranged from 0.677 to 0.967, indicating satisfactory relationships between the indicators and the corresponding latent variables. The analysis of Variance Inflation Factor (VIF) values revealed no significant multicollinearity among indicators, as all values were below the recommended threshold of 5 (Hair & Alamer, 2022; Field, 2000), except for one indicator that met all other relevant criteria and was therefore retained in the model.

Based on the presented indicators, it can be concluded that the applied instruments meet the requirements of reliability, convergent validity, and theoretical consistency, thereby confirming their full suitability for conducting structural equation modelling analysis (Hair & Alamer, 2022).

Table 3. Measurement model and constructs

Constructs	1	2	3	4
1 – Effects of Fraud	0.843			
2 – Financial Reporting Fraud	0.642	0.922		
3 – Operational–Transactional Fraud	0.663	0.870	0.966	
4 – Preventive Measures	0.660	0.537	0.562	0.777

Source: Authors' calculations

Discriminant validity was assessed using the Fornell–Larcker criterion, in accordance with the recommendations of Henseler et al. (2015). The results presented in Table 4 show that the highest value appears on the diagonal (first value in each column), while all other values are lower. These findings confirm that the measurement model exhibits adequate discriminant validity, indicating that the constructs are clearly differentiated and that each measures a distinct and conceptually unique research domain.

Research Results

The SmartPLS algorithm was applied to estimate the relationships among the variables included in the model. Based on the results of the statistical analysis of direct effects presented in Table 4, it was found that the construct *Financial Reporting Fraud* is not statistically significantly associated with the construct *Effects of Fraud* ($\beta = 0.219$, $p < 0.086$). This result confirms that mere perception of the existence of financial reporting fraud does not contribute to reducing the negative effects of fraud on business performance, thereby supporting hypothesis H1.

Furthermore, the construct *Operational–Transactional Fraud* does not show a statistically significant effect on the construct *Effects of Fraud* ($\beta = 0.214$, $p < 0.081$). This finding confirms that perception of operational–transactional fraud alone does not contribute to reducing the negative effects of fraud on business performance, thus supporting hypothesis H2.

Finally, the construct *Preventive Measures* is statistically significantly associated with the construct *Effects of Fraud* ($\beta = 0.277$, $p < 0.001$), indicating that respondents believe the existence of preventive measures contributes to reducing the negative effects of fraud on company performance. Accordingly, hypothesis H3 is supported.

Table 4. Results of direct effects testing

	Path coefficient	t-value	95% confidence intervals (bias-corrected)	Result
H1: FIP → EP	0.219	1.720	[-0.065, 0.439]	Supported
H2: OTP → EF	0.214	1.744	[-0.026, 0.458]	Supported
H3: PM → EP	0.277***	3.312	[0.129, 0.460]	Supported
* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$ FRF – Financial Reporting Fraud; OTF – Operational–Transactional Fraud; PM – Preventive Measures; EF – Effects of Fraud				

Source: Authors' calculations

Based on the results presented in Table 5, it was determined that the construct *Preventive Measures* has a statistically significant negative moderating effect on the relationship between *Financial Reporting Fraud* and *Effects of Fraud*. The result of the indirect effect test ($\beta = -0.249$, $p = 0.001$) indicates a moderately strong moderating effect, suggesting that preventive measures not only influence the relationship between financial reporting fraud and fraud effects but also contribute to reducing the negative effects of financial reporting fraud. Accordingly, hypothesis H4 is supported.

The next result shows that the construct *Preventive Measures* has a statistically significant mediating role in the relationship between *Operational–Transactional Fraud* and *Effects of Fraud*. The indirect effect test result ($\beta = 0.156$, $p = 0.005$) indicates that strengthening preventive measures facilitates the relationship between operational–transactional fraud and fraud effects. In other words, the implementation of preventive measures enables the perception of operational–transactional fraud to contribute to reducing the negative effects of fraud on business performance. Thus, hypothesis H5 is supported.

Table 5. Results of indirect effects testing

	Path coefficient	t-value	95% confidence intervals (bias-corrected)	Result
H4: PM x FIP → EP	-0.205***	3.887	[-0.314, -0.107]	Supported
H5: OTP → PM → EP	0.156**	2.882	[0.098, 0.478]	Supported
* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$				

Source: Authors' calculations

To assess the quality of the structural model, the Stone–Geisser’s Q^2 parameter was used, and all obtained Q^2 values were positive, indicating satisfactory model quality and predictive relevance. The coefficient of determination (R^2) values indicate that the model explains 63.3% of the variance in the *Effects of Fraud* construct and 31.6% of the variance in the *Preventive Measures* construct, which, according to the criteria of Hair and Alamer (2022), can be interpreted as strong and substantial explained variance of the endogenous constructs, respectively.

Additionally, the Goodness-of-Fit (GOF) index was calculated using the formula $\sqrt{(R^2 \times Q^2)}$. The obtained values fell within the acceptable range of 0–1 and indicated high overall model fit. The Standardized Root Mean Square Residual (SRMR) was used as an additional indicator of model fit, with the obtained value indicating good absolute model fit, as it was below the recommended threshold of 0.08 (Hu & Bentler, 1999) (Table 6).

Table 6. Model fit indices

	R^2	Stoner–Geisser Q^2	GOF
EP	0.633	0.420	0.515
PM	0.316	0.276	0.295
SRMR	0.068		
R^2 – coefficient of determination; SRMR – Standardized Root Mean Square Residual; GOF – Goodness-of-Fit index; PM – Preventive Measures; EF – Effects of Fraud			

Source: Authors’ calculations

The research results confirmed that both the measurement and structural models satisfy all standards of reliability, validity, and data fit. All internal consistency indicators exceeded the recommended thresholds, indicating high construct reliability as well as adequate convergent and discriminant validity. The values of the model fit indices further indicate good overall alignment of the model with the empirical data.

Discussion of research findings

The results of testing Hypothesis 1 (H1) indicate that the relationship between financial reporting fraud and its effects is not statistically significant ($\beta = 0.219$, $p \approx 0.086$). Consequently, the mere perception of such fraud does not reduce its adverse impact on operating performance. This suggests that awareness of financial reporting fraud, considered in isolation, lacks a protective function and fails to mitigate the resulting damage. The finding supports the study’s initial premise that risk identification alone is insufficient unless accompanied by the implementation of concrete preventive measures.

Similar to H1 results, the testing of Hypothesis 2 (H2) showed that the relationship between operational–transactional fraud and its effects is not statistically significant ($\beta = 0.214$, $p \approx 0.081$). This finding demonstrates that mere recognition of operational fraud risks does not alleviate adverse outcomes. Organizations that acknowledge the possibility of such fraud but fail to implement systematic preventive measures remain exposed to harmful consequences. The result reinforces the conclusion that effective

fraud risk management depends on institutionalized control mechanisms rather than on sole managerial or employee awareness.

The testing of Hypothesis 3 (H3) demonstrates that preventive measures show a statistically significant and negatively oriented effect on fraud outcomes ($\beta = 0.277$, $p < 0.001$), thereby confirming that their presence mitigates the adverse consequences of fraudulent activity on operations. In other words, the more comprehensive and institutionalized the system of preventive controls, procedures, and oversight, the less vulnerable firms are to the damaging effects of fraud, empirically reinforcing the view that structured mechanisms, rather than mere risk awareness, constitute the basis of effective fraud management.

The results related to Hypothesis 4 (H4) demonstrate that preventive measures play a significant moderate role in shaping the relationship between financial reporting fraud and the adverse consequences. Beyond their direct effect in reducing harm, these mechanisms alter the dynamics through which fraudulent reporting translates into tangible operating outcomes. In environments with stronger preventive systems, the link between fraud and negative performance weakens, underscoring that institutionalized controls, oversight structures, and formalized procedures not only mitigate damage when fraud occurs but also fundamentally reshape the pathways through which fraud risk impacts organizational stability and integrity.

The testing of Hypothesis 5 (H5) confirms that operational–transactional fraud exerts a statistically significant indirect effect on fraud outcomes through the channel of preventive measures ($\beta = 0.156$, $p = 0.005$). This result highlights that the perception of operational fraud can catalyze strengthening preventive systems, which in turn alleviates the adverse consequences of fraud. In this sense, awareness of operational–transactional risks becomes a protective factor only when it is translated into concrete institutional responses, such as enhanced controls, monitoring procedures, and oversight mechanisms, underscoring the importance of transforming risk recognition into actionable preventive strategies.

Conclusion

In recent decades, significant efforts have been made at both the theoretical and practical levels to identify and apply effective approaches to risk management. These efforts have resulted in substantial progress in the field of risk management. In this context, it is emphasized that effective fraud risk management should be based on the principles of corporate governance, operational ethics, and oversight. Taken together, these three factors represent the fundamental pillars of trust and economic stability. It is also emphasized that fraud risk management has emerged as a key component of organizational resilience.

The findings of this study indicate that the mere existence of awareness of financial reporting fraud and operational–transactional fraud does not lead to a reduction in their negative impact on operational performance in dairy industry enterprises. In

other words, a perception of risk that is limited to passive recognition does not result in loss mitigation or protection against the occurrence of fraud risk. This implies that effective fraud management requires more than awareness alone. It entails the institutionalization of preventive measures, structured controls, and proactive oversight mechanisms. Together, these elements should translate identified risks into tangible organizational safeguards.

On the one hand, the limited role of risk perception is evident, while on the other hand, preventive measures are observed as a decisive factor in mitigating the negative consequences of fraud. It is important to emphasize that robust systems of controls, procedures, and oversight have a direct and statistically significant impact on reducing harmful outcomes, thereby highlighting the necessity of institutionalized risk management frameworks. The findings indicate that effective protection against fraud risk requires clearly identified mechanisms that extend beyond individual awareness, relying instead on formalized policies, internal controls, and continuous monitoring, supported by modern technological solutions as the structural foundation of business resilience.

The results reveal a sophisticated role of preventive measures in safeguarding financial integrity, acting not only as direct protective instruments but also as moderators and mediators in the relationship between fraud and its consequences. It is necessary to obtain detailed information on the areas that pose the highest risk of fraud within a specific dairy enterprise. Strong preventive systems reduce the severity of financial reporting fraud, while in the case of operational–transactional fraud, they transform risk perception into actionable protective strategies. Common challenges in this process include organizational resistance, technological integration, and resource constraints. The overall conclusion is that the findings confirm that sustainable fraud risk management can be achieved when awareness is systematically transformed into concrete, formalized, and enduring preventive mechanisms that strengthen financial integrity and organizational stability. Each activity associated with risk carries unique implications for the financial health of the organization, which should also be taken into account when defining a fraud risk management strategy.

Conflict of Interest

The authors declare no conflict of interest.

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